

WHAT IS CLAIMED IS:

1. A retention system for nozzles of a turbine, comprising:

a nozzle retention ring for disposition about an axis of the turbine;

a plurality of circumferentially adjacent nozzle segments carried by said nozzle retention ring; and

anti-rotation pins extending in generally axial directions and engaging between said retention ring and said nozzle segments, respectively, to restrain movement of the nozzle segments in a rotational direction about the turbine axis.

2. A system according to Claim 1 wherein said retention ring includes an axially facing surface, said anti-rotation pins being exposed through said surface and at least one retention plate segment overlying the axially facing surface, precluding removal of the pins in an axially direction.

3. A system according to Claim 2 wherein said retention plate segment comprises one of a plurality of arcuate retention plate segments arranged in an annular array thereof about the axis.

4. A system according to Claim 2 wherein each of said nozzle segments includes an outer band and a pair of axially spaced apertures, said retention ring having aligned openings whereby each said pin is received in said apertures and said openings.

5. A system according to Claim 2 wherein said retention plate segment comprises one of a plurality of arcuate retention plate segments arranged in an annular array thereof about the axis, said arcuate retention plates being bolted to said retention ring.

6. A method of removing in an axial direction a selected nozzle segment of an annular array of nozzle segments forming a stage of a turbine from a retention ring carrying the annular array of nozzle segments, comprising the steps of:

- (a) removing in a generally axial direction substantially axially extending pins from a plurality of nozzle segments of the annular array thereof, including the selected nozzle segment, and said retention ring, thereby releasing nozzle segments adjacent said selected nozzle segment for sliding movement about an axis of the turbine in a circumferential direction away from the selected nozzle segment;
- (b) sliding the released nozzle segments adjacent said selected nozzle segment in a circumferential direction about the axis away from the selected nozzle segment; and
- (c) removing the selected nozzle segment in a generally axial direction.

7. A method according to Claim 6 wherein said nozzle segments are spaced from one another about the axis to define gaps between adjacent nozzles and step (b)

includes sliding said adjacent nozzle segments in the circumferential direction away from the selected nozzle segment to stack the adjacent nozzle segments one against the other and thereby open a gap between said adjacent nozzle segments and said selected nozzle segment enabling removal of said selected nozzle segment in said generally axial direction.

8. A method according to Claim 6 wherein said nozzle segments are spaced from one another about the axis to define gaps between adjacent nozzles and step (b) includes stacking said adjacent nozzle segments one against the other in the circumferential direction away from the selected nozzle segment to close the gaps between said adjacent segments and open a gap between the selected nozzle segment and said adjacent nozzle segments of sufficient circumferential extent to enable removal of the selected nozzle segment in the generally axial direction.

9. A method according to Claim 6 including removing at least one inner diameter retention plate from an inner casing to release an inner band of said selected nozzle segment to enable removal of the selected nozzle segment in the generally axial direction.

10. A method according to Claim 6 including securing retention plate segments to said retention ring to overlie said pins and prevent removal of said pins in said substantially axially extending direction.

11. A method according to Claim 6 including, prior to step (a), removing at least one retention plate

segment overlying said anti-rotation pins to enable the pins for removal in said substantially axial direction.

12. A method of installing a selected nozzle segment into an opening in an annular array of nozzle segments for forming a stage of a turbine, comprising the steps of:

- (a) inserting the selected nozzle segment in a generally axial direction into said opening;
- (b) inserting a pin in an axial direction through the selected nozzle segment and the retention ring to secure the selected nozzle segment to the nozzle retention ring;
- (c) sliding nozzle segments adjacent the inserted selected nozzle segment in a circumferential direction toward said selected nozzle segment into predetermined circumferential positions about the turbine axis; and
- (d) securing said adjacent nozzle segments to said retention ring in said predetermined circumferential positions.

13. A method according to Claim 12 wherein step (d) includes inserting pins in an axial direction through said adjacent nozzle segments and the nozzle retention ring to secure the adjacent nozzle segments to said nozzle retention ring.

14. A method according to Claim 12 including, prior to step (a), releasing the adjacent nozzle segments from the nozzle retention ring for sliding movement about the axis of the turbine in the circumferential direction and sliding the adjacent nozzle segments in a circumferential direction about the axis to provide said opening in the annular array of said nozzle segments.

15. A method according to Claim 12 and, subsequent to step (d), securing a plurality of inner diameter retention plates to a casing of the turbine to retain inner diameter band portions of the nozzle segments in the turbine.

16. A method according to Claim 12 including, subsequent to step (d), securing at least one retention plate segment to said retention ring overlying an axially facing end of said pin.

17. A method according to Claim 16 including inserting pins in a generally axial direction through said adjacent nozzle segments and said retention ring to secure the adjacent nozzle segments to said retention ring, and securing at least one retention plate segment to said retention ring in overlying relation to an axial end face of said pins to retain said pins in positions securing the adjacent nozzle segments and retention ring to one another.